SHOUT
SHARE
IT

STATION BULLETIN 359 JUNE, 1945

GROWING HOUSE PLANTS

By W. D. Holley

AGRICULTURAL EXPERIMENT STATION
UNIVERSITY OF NEW HAMPSHIRE
DURHAM, N. H.

Growing House Plants

By W. D. Holley

A large majority of the gardeners in the northern half of our country spend several months of each year gardening indoors. The absence of specific information on many of our common house plants has led to the initiation of this work.

Fig. 1—Many successful growers keep their plants in deep saucers so they can be adequately watered

Most of the material used in this publication has been obtained from the only satisfactory house-plant laboratory — the home. With the cooperation of housewives in Durham, and in other parts of New Hampshire, many plants have been under observation. The study is still going on with kinds of plants not included here, the results of which will be published at a later date.

METHOD

Briefly, the method of study on each kind of plant was as follows: From 15 to 35 plants were placed in as many homes and left for two months or longer. No instructions were given the co-operating grower as to the culture of plants being studied. At the end of the period nec-

essary to get conclusive results, the plants were taken up and their condition was correlated with the treatment they had received. This treatment was determined by means of questionnaires filled out at the time plants were taken up. Below is a copy of the questionnaire used in this study:

QUESTIONNAIRE

Name of Plant ..... Date picked up .....
Name of Person ..... Date distributed .....

I. Window exposure —
II. Watering practices —
How watered —
Frequency —
III. Temperature —
Night —
Day —
IV. Were plants washed —
V. Type of heating system —
VI. Type of container —
VII. Feeding practices —
VIII. General condition of plant when taken up —
(a) Insects —
(b) Disease —
(c) Gas injury —

Remarks:

(It is interesting to note that some of the most valuable information was obtained under the section of remarks.)

SOILS USED

No attempt was made to compare different soils or soil mixtures for any given plant. In each case, a soil mixture that was believed to be optimum for the plant studied was used. Leaf mold was used freely with good results. This material is available to all who will take the trouble to collect it. By raking away the litter in any wooded area, one can obtain black, well-rotted leaf mold. The material from deciduous trees is preferable to that from evergreens. Leaf mold will seldom give good results alone but is excellent for use in soil mixtures, when as much as half of the mixture may be of this material.

The use of well-rotted manures is another help in soil mixtures. One of the reasons farm women are so successful with house plants is because manures are easily accessible to them.

CONTAINERS

Glazed, porous, and painted pots and jardinieres were used throughout this study. Glazed pots are of distinct value in growing plants with a high water requirement, such as gardenia. Fewer waterings are required when plants are growing in glazed pots or are kept in jardinieres. (The jardiniere is of special value when growing plants in small pots.)

FEEDING

Throughout this study a large majority of the successful plants were fed regularly. Average growers used chemical garden fertilizer at the rate of about one level teaspoon to a quart of water and watered plants with this solution about once in two weeks. Other growers used plant food purchased in tablet or liquid form. There are many plant foods available but care should be taken to use them according to the packagers' directions.

Flowering plants respond to regular feeding more quickly and more luxuriantly than do foliage plants. In almost every case, flowering plants that rated excellent had been fed regularly. With some few ferns and foliage plants the results of feeding were not so apparent. In some instances, it is desirable that a plant remains almost stationary in size. In this case feeding would be a disadvantage. A good soil mixture at the start will go a long way toward growing a successful plant.

WATER

The majority of successful growers checked plants daily and watered when necessary. Various means were used for telling when plants needed water. Some growers use the appearance of the soil surface as an indication while others water when the soil feels slightly dry to the touch.

Some of the most successful growers kept their plants sitting in deep saucers as shown in *Fig. 1*, page 3. When the plant needed water they filled the saucer and let the plant and soil absorb it by means of capillarity. This, or any other method of watering plants from the bottom of the container, is an excellent practice because it insures a thorough wetting of the ball of soil.

Fig. 2—Normal cyclamen grown at 50 to 60 degrees night temperature compared with one grown at much too warm temperature

Drying or a lack of water caused many of the failures while overwatering accounted for some. If plants are soaked thoroughly when watered, then allowed to become slightly dry before watering again, both these troubles may be avoided.

TEMPERATURE

Adverse temperatures are among the most detrimental of all factors encountered in growing plants in the home. The night temperature is much more critical than day temperature — likewise, plants growing in sunny windows or strong light can stand higher temperatures than the same plants growing in poor light. Only the toughest house plants are able to stand a combination of temperatures of 70° F and above, and poor light conditions. *Fig. 2* shows a normal cyclamen plant compared to one grown at a high temperature with poor light.

Fig. 3a (left)—A special container for starting tiny seeds
Fig. 3b (right)—Seedlings of many house plants are more easily grown in boxes of soil until large enough for 4- or 5-inch pots

Other detrimental effects of high temperatures are rapid drying and the accelerated rate of increase of insects on plants, especially thrips and red spider mites.

PROPAGATION

Plants are propagated either by seed or from vegetative parts. Many plants that are used in the home do not produce seed under these conditions. Some varieties do not come true from seed and other plants are produced from seed with some difficulty. Fortunately, in these cases, there are other ways of propagation.

Where propagation by seed is possible, plants are usually free from insects and often more vigorous from the beginning. Starting tiny seeds and watching them grow into mature plants afford a particular joy to many plant lovers. A special container for germinating seeds is illustrated in *Fig. 3A*. This apparatus has been used successfully at the University of New Hampshire in starting many kinds of seeds under the most exacting conditions. The small porous pot in the center is stoppered to hold water and is kept full of water at all times. The large pot or pan should be porous; common flower pots are satisfactory. A good house-plant soil mixture, with sufficient organic matter to make it retentive of moisture, is satisfactory for starting most seeds. Enough sand

should be added to the soil mixture to make it gritty. This addition of sand and the use of a porous pot will provide aeration of the soil which is necessary for germinating and growing small seedlings. No covering of the seed is necessary, provided a pane of glass is used to cover the top of the container. As soon as seed have germinated, the glass may be removed gradually to increase aeration and to prevent "damping off" of the seedlings. If seedlings begin to "damp off" or rot off at the soil surface, moving the seed pan to a cooler location will often check this trouble. To give the soil an initial soaking the large pot may be set in water until the soil is thoroughly wet. After this first watering, keeping the small pot in the center filled will supply adequate water. Seedlings may be left in this container until they become crowded. Begonia and African violet seedlings may be grown three or more months before they are ready for transplanting. Although this container is useful for starting most seeds, it is especially valuable for germinating tiny seeds, such as those of begonia, African violet, gloxinia, Streptocarpus, Gesneria, Exacum, and double petunias. Many of the larger seed are easily started in pans or flats of soil, using ordinary methods.

The most common vegetative means of propagation are the rooting of cuttings or "slips" and by division of the parent plant. Slips of many plants may be merely detached from the parent plant and placed in a container of water until roots have formed. A suitable container for rooting cuttings, using sand as a medium, is shown in *Fig. 4A*. A uniform moisture content is maintained by keeping the small pot in the center filled with water. Cuttings usually produce a better root system in a well-aerated medium, like clean, sharp sand, than in water.

The selection of cuttings for propagation is important. Those stocky side growths or basal branches on plants like begonias are most satisfactory. On other plants it is necessary to take healthy growing tips. African violets, gloxinias and certain pepperomias may be rooted from leaves with a petiole attached. Rex begonias, bryophyllums, and the sword plant, or *Sansieveria*, may be started from pieces of leaves.

All cuttings should be potted in a good soil mixture as soon as roots are well formed. Since plants dry out more rapidly in small pots this should be taken into consideration when selecting a container for a newly-rooted cutting. A small vegetable plant box is especially satisfactory for growing cuttings until they are large enough for their final pots.

Fig. 4a (left)—Suitable container for rooting cuttings. Fig. 4b (abovê)—Various types of cuttings used in propagating house plants

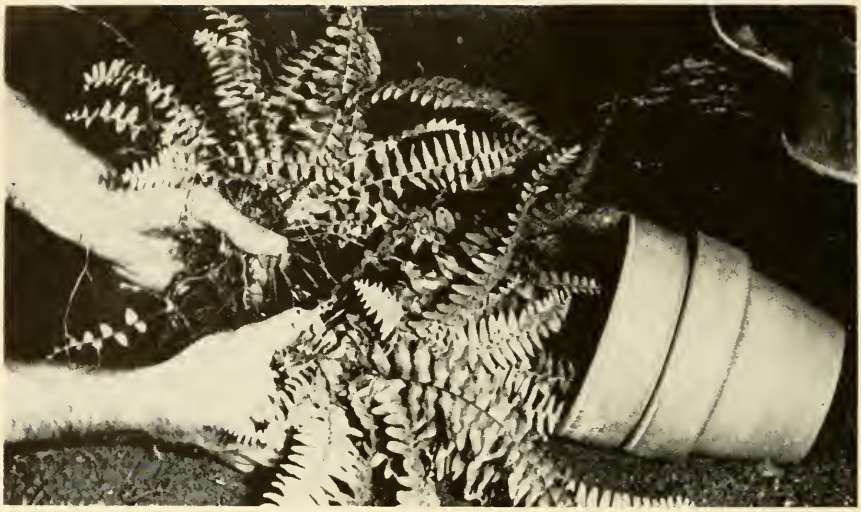

Fig. 4c—The Boston fern lends itself readily to rough division

Fig. 4d—Offsets are natural means of propagating many plants

Some plants naturally have a somewhat clumpy habit of growth and may be divided into two or more plants at the time of repotting. Although this is a satisfactory method of multiplying many plants, it is usually a mistake to divide African violets. Plants that lend themselves to division are Boston fern and its varieties *(Fig. 4C)*, certain begonias, the sword plant, aspidistra and plants of similar growth habits. *Antheericum*, or spider plant *(Fig. 4D)*, *Saxifraga,* or strawberry plant, and a few others produce offsets and runners which may be potted and grown for new plants.

CONTROL OF INSECTS ON HOUSE PLANTS

Insects can be controlled on your house plants. There is a control measure that will keep in check and eliminate every bug, with the exception of some mites. Some practices are helpful in controlling all house-plant insects.

General Control Measures

1. Quarantine of new plants until they are proved to be free from insects
2. Isolation of any plants that begin to show signs of insects and removing them to a cooler temperature
3. Never placing cut flowers in close proximity to house plants or to the window garden
4. Regular washing with a jet or fine spray of lukewarm water

Some plants may not be washed without injury to the foliage but these are few. The principal damages that washing may possibly cause under dry home conditions are mechanical injury and breaking of the plant or leaves. If a plant is not extremely fragile, it will enjoy a regular weekly bath.

A mere dipping of plants in water will be of little value in eliminating bugs. When water is applied under pressure, it is often possible to wash off many of the insects, their eggs or other stages. With each succeeding bath the insects become fewer until they have finally been eliminated entirely. The removal of dust during washing improves the plant's appearance, if not its general health.

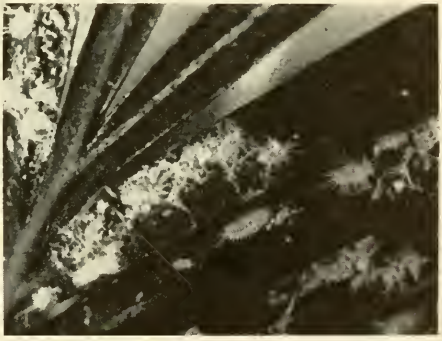

Fig. 5a (left)—The adult mealybug is about ¼ inch long
Fig. 5b— (right)—The mealybug tends to form colonies

Mealybug

The mature bug is about ¼ inch long, oval in shape and covered with white waxy powder. Its body is also covered with numerous hair-like projections. Mature adults move about freely until ready to lay eggs, at which time they spin a cottony mass and deposit from 300 to 500 eggs.

Mealybugs do not produce a winged stage, but they may spread from plant to plant by contact, or they may get on clean plants from dirty

containers or old plant stakes. The mealybug has the remarkable faculty of entering into a somewhat dormant state and remaining on plant stakes or containers for long periods without any food whatsoever.

When feeding on many plants, they excrete a sticky substance called honeydew. If this material is not washed off, it becomes a medium for the growth of a black-sooty fungus that further detracts from the plant's appearance. Honeydew also attracts small ants and, in turn, the ants furnish the mealybug with transportation to other plants. This relationship between ants and plant insects is very common, especially in the garden.

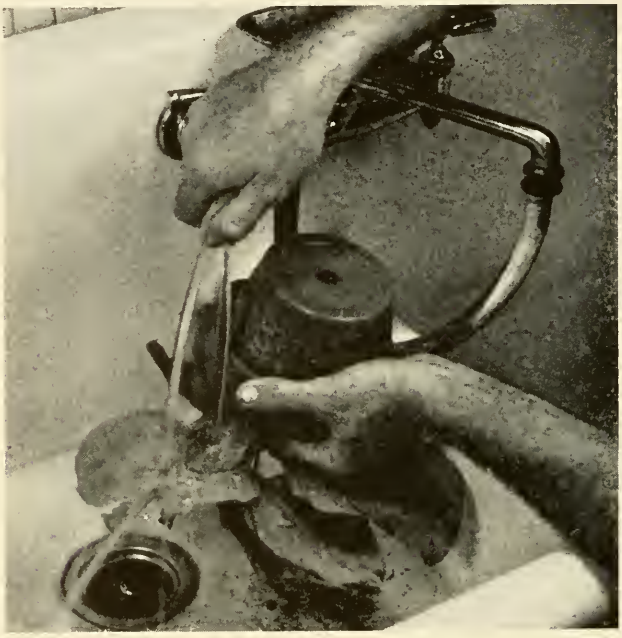

Fig. 5c—Regular washing is an excellent control measure for most insects that infest house plants

Any control measure that prevents the bugs from reaching the mature egg-laying stage is helpful. Regular washing with a jet of water is useful for removing the older insects and the egg masses. Infested plants should be isolated as soon as discovered. Containers that have had mealybug-infested plants in them should be washed carefully and stakes that have been used on such plants should be burned.

Sprays or dips of contact insecticides are valuable. A dip made of one tablespoon of nicotine sulphate to one gallon of warm soapsuds is good. Volck is an excellent material for use as a dip or spray for killing mealybug. The most important part in controlling mealybug is persistence. Any control measure must be repeated in two-week intervals for several times, or until all signs of the insect are gone.

Thrips

Thrips are tiny insects seldom measuring more than 1/20 of an inch in length. They are slender, and vary in color from green or white for the young insects to brown or black for the adults.

The injury caused by thrips is so characteristic that their presence is easily recognized. They feed by scraping the epidermis of the leaf and sucking the sap from bruised cells beneath. Injured tissues turn gray or silvery colored and black specks of excrement are usually present around the affected area. Older leaves are usually affected most. With some plants the lower leaves first assume the symptoms previously mentioned, then the leaves begin to take on a dried or burned appearance. The gloxinia is damaged severely by thrips. The leaves assume a rusty appearance first and eventually the buds may fail to open.

Thrips multiply much more rapidly at warmer temperatures, so when an infestation occurs it is well to move the plant to a cooler location until the insects are under control.

Other control measures are regular washing and contact sprays, if it is possible to use them. Tartar emetic (½ teaspoon) and brown sugar (2 teaspoons) mixed in 1 pint of water and sprayed on plants in a light mist with a household fly sprayer is an excellent control. Very minute quantities of this material are necessary because it acts as a bait and attracts the thrips. Tartar emetic is a deadly poison, so should be used with extreme care. Any control measure used for thrips should be repeated at short intervals, for all stages of the insect are present at one time, and some stages are more susceptible to spray treatment than others.

Scale Insects

Scale insects are probably the most troublesome on ferns and foliage plants. They are tiny insects that work under cover of a flattened scale that is usually gray, orange, brown, or black in color. They feed by inserting their mouth parts into the cells of the leaf and sucking out the plant juices. The spot directly under one of these insects becomes brown or yellow and eventually the entire leaf becomes lighter in color. A sticky excretion from this insect is often present on the leaves with them.

Fortunately, these insects are stationary, except for the first few hours of their existence. Judicious pruning is helpful where the infestation is localized to a few leaves or stems. Where the infestation is se-

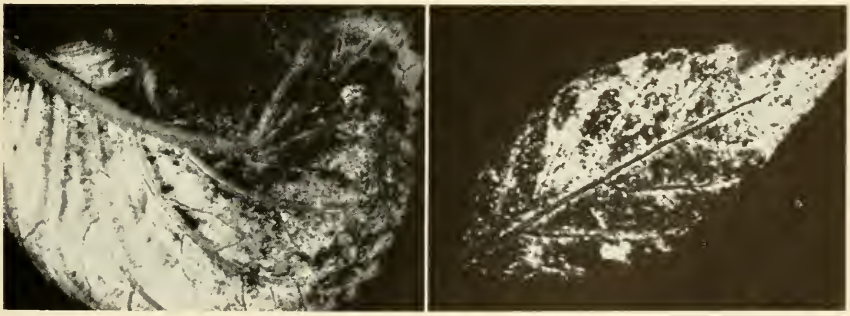

Fig. 6a (left)—Thrips injury on gloxinia leaf. Fig. 6b (right)—Typical thrips injury on an older leaf of browallia

vere and the plant is seriously weakened, it may be advisable to destroy the plant entirely and start with a clean one. If plants are valued highly, it is possible, although sometimes very tedious, to wash off the scale by using warm soapsuds and rubbing the insects loose with a soft cloth. If the plant is not too large, it may be possible to set it in the sink and give it a syringing with water under pressure. If this syringing is done at regular weekly intervals, it may be possible eventually to rid the plant of scale insects or to lessen the population to a considerable degree.

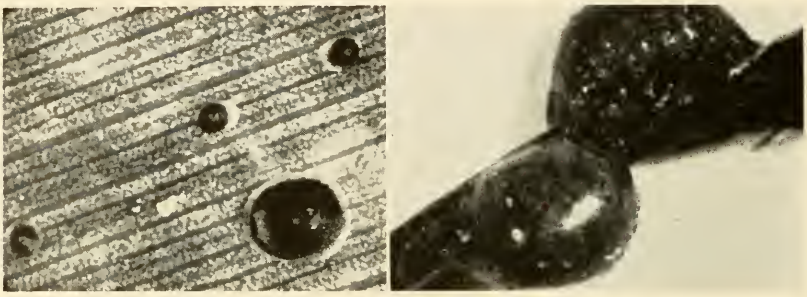

Fig. 7a (left)—Tiny scale insects (magnified) are usually orange, gray brown, or black. Fig. 7b (right)—Some scale insects are most trouble on ferns and foliage plants. Here they are shown infesting maidenhair fern

Volck, a miscible oil spray, may be used effectively as a dip in controlling most scale insects. This material should be available from local plant supply stores or from reputable seedsmen. DDT has proved an excellent material for killing scale, and is safe on most plants. In using Volck, or any other control measures, the treatment should be repeated several times to give a satisfactory control.

Aphid or Greenfly

Although aphids are the commonest of all house-plant insects, they are by far the easiest to control. Aphids are small, usually green in color, and capable of multiplying rapidly. If left alone they will do much damage. Usually they are wingless, but under adverse conditions, such as in late fall, they produce winged stages. Aphids may come into the home on cut flowers or potted plants.

Fig. 8a (left)—Aphids usually infect plants of the rapidly growing types. Fig. 8b (right)—They cause a deformity of flower buds, especially on gardenia

Fortunately, washing plants regularly is helpful in controlling aphids, as is any good contact insecticide. It is not always possible to spray plants in the home, but it is possible to use a contact insecticide as a dip. Insecticides should always be used according to the packagers' directions.

White Fly

The adult white fly is a small white winged insect about 1/16 inch long. The younger stages, which are wingless and greenish white, may be found under the leaf along with numerous small black bodies which are actually parasitized young. A tiny insect parasite punctures and inserts its egg in the body of the white fly, which, in turn, becomes blackened and dies.

Fig. 8c—Adult white fly (1/16 inch long) with young

White fly is especially troublesome on fuchsia, geranium, begonias, and a number of other house plants. As the flies are covered with a waxy substance it is rather difficult to control by spraying. One of the most practical ways of killing white flies in the home is washing the plants weekly with soapsuds, which should be washed off with clear water after drying on the plant. A dip of Volck is often helpful in getting results. Nicotine sulphate at the rate of 1 tablespoon per gallon of warm soap suds used as a dip will give good control if used at weekly intervals for four or five weeks. A wash or dip kills few of the adults but will destroy the wingless young.

Mites

Of the mites that are troublesome on house plants, red spider mite is by far the most common. Red spiders are tiny, being smaller than a pinhead when grown, and thrive in a warm, dry situation. The use

of clear water as a syringe is one of the most effective control measures. An infestation of red spider mite in the advanced stages will be well covered with webbing, but even this webbing can be syringed off with little difficulty. Syringing the plant with a jet of water helps in ridding the plant of both eggs and adults. Red spider mites are quite troublesome on morning glories and vines which are not easily washed. This is a good argument for not growing them in the home.

Fig. 9a—Red spider mites are about the size of a pin head

Cyclamen mites are also troublesome on some house plants, especially African violet, geranium, and some of the begonias. The signs of their presence are usually curled leaves, extreme hairiness on the younger leaves of the African violet, and deformed younger leaves and shoots on begonia and geranium. Commercially, cyclamen mite may be controlled by fumigants, but under house conditions our best bet is to prevent spread from infested to healthy plants. This spread is accomplished by handling or by contact of the two plants.

As plants seldom outgrow the injury or damage from cyclamen mite, it is best to discard any plants that become infested and start over with

Fig. 9b—Cyclamen mites cause a curling and extreme hairiness on the new leaves of the African violet

clean plants. Containers that have had these mite-infested plants should be washed carefully and any stakes that have been used on the plants should be burned. *Figs. 9B* and *C* show cyclamen mite injury on African violet and begonia respectively.

Soil Insects and Lower Animals

These may be various, including sow bugs, slugs, millepedes, earthworms, and others. Some of these insects and animals cause trouble to plants by eating on the roots or leaves and some of them, such as earthworms, may injure the physical condition of the soil by their constant working.

Fig. 9c—Cyclamen mites cause deformation of new growths on begonia

The most satisfactory method of controlling these pests is to bake the soil before using it to pot plants. Soil baked in an oven from 182° to 200° F long enough to cook a large-sized potato will greatly reduce the animal life present. In baking the soil it is best to spread it out in pans in depths or one inch or slightly more.

EXPERIMENTS WITH HOUSE PLANTS

African Violet

Saintpaulia kewensis

Twenty-six African violet plants of the variety Blue Boy were grown for three to 18 months by as many cooperating housewives. As these plants were returned they were classified as follows: four excellent, six very good, five good, seven fair, and four failures.

One of the failures was due to insects, two to insufficient water, and one to a combination of lack of light and a high night temperature of 72° - 75° F.

Soil used

A mixture of two parts of good compost soil and one part leaf mold was mixed with enough sand to make the mixture gritty.

Window exposure

These plants were placed in about every conceivable place where plants can be kept, with the result that information obtained should be helpful.

Of the four failures one was not kept in a window and three were in east or southeast windows but failed for other reasons.

Of the seven plants in the fair group, four were not in windows, two were in west windows, shaded so they received very little sun, and one was kept in a northeast window.

Fig. 10a—African violet is one of the most interesting house plants. Its colors are pink, white, and shades of purple

Of the 15 plants that rated good or above, only one was kept in a north window, another was never in direct sun but in a very light room, and the remaining 13 were kept in sunny windows all or a good part of the time. Some growers preferred a slight shade, such as a thin lace curtain, to protect their plants from the direct rays of the sun. This was especially true for African violets that were kept in south and west windows. Plants in north windows tended to flower periodically while those in sunny windows flowered continuously.

Watering

Insufficient water caused the failure of two plants and damaged several of those which rated fair. There was no damage from overwatering to any of the plants, even though some of the growers tried to keep their plants on the moist side all the time. Most of the growers applied water through the bottom of the pot by setting the pots in a small container of water; but watering from the top caused no damage on nine of the

26 plants. Watering from the bottom is an advantage, however, in that the soil is sometimes soaked more thoroughly. Evidence from this experiment indicates that the African violet needs adequate water at all times. Severe drying may cause serious damage and limit flowering.

Container

The plants of this group were grown in porous and glazed pots and in porous pots set in various kinds of jardinieres. Various metal jardinieres used gave no ill effects. There was no difference between the plants grown in the several types of containers. Plants are somewhat easier to water when kept in jardinieres and the danger from excess drying will be less than when the entire porous pot is exposed to the dry atmosphere of a room. However, if adequately watered, the African violet will be equally successful in any of these containers.

Temperature

The African violet is one of the most satisfactory of flowering plants at higher temperatures, *provided* sufficient light is available. Two of the three plants of this group tried under adverse office conditions were highly successful. The one failing received the same temperatures of 70° - 75° F but north light only. In general, night temperatures of 60° - 70° F and day temperatures 65° - 75° F gave very satisfactory plants. Temperatures below 60° F slow up growth and development of the African violet considerably.

Feeding

All plants rated as excellent and all but one of the plants rated as very good were fed regularly. Only four of the 11 plants rated fair and failure received additions of plant food.

Insect control measures

Insects were not a problem on the plants used in this experiment because they were clean of pests when distributed. Two plants had slight infestations of mealybugs when returned and cyclamen mite injury was responsible for the failure of one plant. Since they are very difficult to control, these two insects are by far the most serious troubles on African violet. Isolation is the most valuable control measure to be used. As

Fig. 10b (left)—Rooted cuttings are easily grown to proper size for potting in this simple container. Fig. 10c (right)—As soon as plants have made a good growth they are placed in individual pots

soon as one of these troubles occurs, either destroy the plant and get a clean one in its place or isolate the sick plant. Mealybugs may be killed one at a time by pricking with a toothpick, but this is a long, tedious process requiring several weeks or even months to get a plant entirely clean. By far the easiest method for controlling mealybugs on African violets is to obtain clean plants and keep them clean by never letting them come in contact with other plants that are infested with mealybug.

Fig. 10d—A normal African violet (center) compared with an injured plant (left) watered with cold water. On the right is a plant infested with mites

The cyclamen mite cannot be seen with the naked eye but the trouble it causes is easily recognized. The basal portion of the upper surface of the leaves, near their junction with the petioles, first develops an unusual fuzziness. The leaves, especially the new and tender ones, begin to curl and, in severe cases, the leaves become so deformed and crowded that flower stems cannot get through them. The mite usually comes in on new plants, hence a good argument for quarantining until they have proved to be clean. The cyclamen mite is spread primarily by contact or handling. There is no satisfactory method for controlling cyclamen mite under home conditions, so plants showing cyclamen mite injury should be discarded as soon as discovered.

Leaf Spot

Although not giving appreciable trouble to the growers in this experiment, leaf spot is a rather common trouble on African violet. It appears as yellowish-white spots or blotches on the leaves and may cover almost the entire plant in severe cases. Contrary to popular belief, this trouble is not caused by water on the leaves. Workers at the Ohio Experiment Station have produced the trouble by watering plants with cold water. They have been unable to produce leaf spot on African violet when watering with warm water even when the leaves were watered. This trouble may be avoided by watering with lukewarm water.

Suggested summer care

Since African violets are very tender, it is not advisable to place them out of doors during the summer. Plants may be flowered the year around or they may be rested through the summer by allowing them to run slightly drier than usual. Continual blooming for from 12 to 18 months was not detrimental to plants in this experiment. Windows with

sunny exposures are not as desirable for African violets, during the summer, since damage from too much sun may result. A north or northeast window is usually good. Given the same care otherwise, a plant should bloom all summer. Plants may be grown several years in the same pot, but better results are usually obtained by occasional shifting of plants to larger pots and by starting new plants to take the place of old ones grown too large. New plants are readily propagated by detaching a leaf with petiole and rooting it in water, sand, or soil. Although the African violet has a clumpy type of growth, it is not advisable to use division as a means of propagation. Expert plant growers divide them successfully, but the amateur may lose all the divisions because of a crown rot organism which gains entry through the injured roots or crown.

Limited trials with the variety Pink Beauty indicate that it is equally easy of culture. The African violet is also available in white, purple shades, and other blue varieties.

Begonia Semperflorens and Its Varieties

The begonias comprise the largest and most varied group of plants used in the home. Of the many species, forms and varieties in general usage for house plants, *Begonia semperflorens*, or the wax-leaf begonia, and its varieties are the most popular. These begonias are more or less everflowering which probably explains their popularity. Their flower color ranges from red and orange-red through the various shades of pink to white in both single, semi-double, and double flowers. Foliage color ranges from green to deep wine-red and some varieties have speckled or white leaf formations.

Several varieties of *Begonia semperflorens* have been tried in New Hampshire homes over a period of three years. The single-flowered varieties are of slightly easier culture than the double-flowered, but the difference is not great. The Calla begonia is somewhat more difficult to grow but some amateur growers have succeeded equally well with the three types.

The four varieties distributed in as many homes were under observation for periods of two to 15 months, with results as shown in Table I.

Table I

No.	Variety	Description	Very satisfactory	Satisfactory	Poor	Failure
10	Carmen	Pink, single flowers, red-leaved	0	8	2	0
8	Westport Beauty	Pink, double flowers	0	6	2	0
11	Geneva Scarlet	Red, double flowers	1	5	2	3
25	Calla begonia	As shown in Fig. 11B	7	8	4	6

Of the nine failures six were caused by overwatering, two by drying, and one failed because of a combination of high temperature and poor light. The two plants of the variety Westport Beauty performed poorly because of lack of sunlight.

The soil for these plants was a mixture of two parts compost, one part leafmold, and one part sand. Begonias should have a well-drained soil to lessen the danger from overwatering.

Window exposure

Those varieties grown primarily for their flowers were most successful when grown in sunny windows. Two plants of Westport Beauty, grown in north windows, were unsatisfactory. One of these made healthy growth but failed to flower. Too much sun coupled with drying caused the foliage to take on a reddish hue with marginal scorching of the leaves in several instances.

Fig. 11a (left)—The popular wax begonia (single flower).
Fig. 11b (right)—A well-grown wax begonia (double flower)

Since the Calla begonia is decorative for its foliage formation, it is not absolutely necessary to have it flower. Although the majority were kept in sunny windows, some successful plants were grown in all window exposures. Good north light is sufficient to make an excellent foliage plant of the Calla begonia providing other growth factors are favorable. During winter months the amount of sunshine received regulates greatly the extent of flowering of begonias.

Container

Porous and glazed pots were used in about equal numbers. More care in watering is necessary, especially with the double-flowered varieties, when begonias are growing in glazed pots. A begonia plant should never be allowed to stand in water once the ball of soil is thoroughly wet.

Feeding

Regular feeding will not take the place of other necessary care nor will it prevent failures. A majority of the successful growers fed their plants from two to four times during a season. Most growers either used liquid fertilizer or dissolved the chemicals in water and used the solution for watering their plants. A decided improvement in general vigor and number of flowers could be noted on plants that were fed regularly. Especially was this true with the double-flowered varieties.

Watering

Overwatering, resulting in crown rot or a rotting of the roots, caused two-thirds of the failures. This trouble may be avoided by allowing the soil to become slightly dry before each watering, then wetting the ball of soil thoroughly. Some growers advocate growing begonia

Fig. 11c—The Calla begonia is not so hard to grow as many people believe

plants on the dry side, but this is confusing. Plants can easily get too dry, especially in very sunny weather. Two plants of the group under observation were unsatisfactory because of inadequate soil moisture.

Fig. 11d—A lack of light may cause shoot buds, instead of usual flower buds, to form on begonia

Instead of wilting, as do most plants when they become excessively dry, begonia leaves take on a lighter color but remain erect. The result of such drying may first appear as browned or scorched margins of the leaves, eventually leading to the death of all or parts of the leaves affected.

Temperature

Begonias are tolerant to a wide range of temperatures, providing good light conditions are available. One Calla begonia failed in a north window with a night temperature above 70° F. The *semperflorens* group of begonias are less tolerant to high temperatures than some other begonias that are grown primarily for foliage. All of the successful plants in these experiments were grown at night temperatures below 70° F, with the majority grown at 50° - 65° F.

Insects

That there was no insect trouble on any of the 54 begonias in these trials is indicative of their relative freedom from pests. However, aphids, mealybugs, thrip, and mites may trouble begonias in some instances. Except for some damage to open flowers, begonias may be washed regularly to keep them clean of insects.

Key to other troubles

1. Good growth but failure to bloom may be caused by insufficient light.

2. If leaves and stems take on a reddish cast and growth is retarded, the trouble may be caused by too much sun, usually but not always, coupled with drying.

3. A scorching of the margins of the older leaves is usually caused by inadequate soil moisture, or an overly rich soil, or both.

4. When leaves and flowers fade in color, growth becomes long-jointed and spindly, flowers usually become smaller or the plant may fail to bloom entirely, the plant is suffering from a lack of light, too high a temperature, slightly too much moisture, or a combination of these factors.

5. If all or part of the plant rots off at the soil surface or an examination of the root system reveals rotted roots, overwatering is probably the cause.

Additional notes on the Calla begonia

Some strains are more vigorous and more easily grown than others. Vigor seems to be tied in with the amount of green coloring in the leaves. Those strains that tend to form new basal shoots that are solid green for some time before developing the calla formation seem to be much easier to grow. The white leaves tend to be parasitic on the green ones for they are not able to manufacture food. The more white leaves there are present the less vigor the plant will have.

Calla begonia can be grown from seed although the seedlings will not be uniform. By growing a number of seedlings to maturity it is easily possible to select desirable plants that may then be reproduced by slips.

As with other begonias, the Calla requires regular pruning to keep it decorative. Branches grow out, develop callas and flowers, but eventually the plant becomes ragged in appearance. Branches past maturity should be removed back to the next branch or to the crown of the plant to stimulate vigorous new growth at that point. A number of growers pruned their plants regularly, while others might have had more decorative plants had they pruned off the unsightly parts.

These begonias are seldom at their best all the time, but tend to be good one month and rather shaggy the next.

In general they are not difficult to grow, requiring watering and other care not unlike that given the majority of flowering house plants.

Calla begonias are easier to grow in pots five inches in diameter or larger to prevent excess drying and rapid changes in soil moisture. Excess drying will cause the stems and callas to become brittle and drop. Drying also causes the callas to scorch and brown prematurely .

Suggested summer care

Many different methods of summer treatment are given the wax-leaf begonias. They may be flowered inside or on porches through the summer and then discarded after new plants have been started from slips or seeds. Some growers place the plants in flower beds or borders, others in window boxes. When so treated they may be gradually cut back in late summer and eventually lifted and repotted to be brought indoors. Begonia clumps may be successfully divided into two or more smaller clumps at this time, providing care is taken not to overwater the divisions. At the time of division and repotting, if the plants have been injured, they are quite susceptible to crown rot organisms. It is well to soak the soil thoroughly when plants are first potted, then to keep them in a cool, shaded place for a week or longer without further watering. As soon as new growth is apparent, watering may be resumed in the usual manner. The later in the season this repotting is done the less danger from crown rot, as the temperatures are cooler.

Boston Fern

The Boston Fern and the many other varieties of *Nephrolepis exaltata* are among the most commonly grown of all ferns. The ease with which these ferns are grown, especially in windows that do not get full sun, justifies their popularity.

Twenty-two plants were included in this experiment and were left in as many homes for periods varying from three to 17 months.

Exposure

The plants under observation were given all possible exposures with the results shown in the table following:

Table II

Exposure	Total	Excellent	Satisfactory	Not satisfactory
Sunny	5	1	1	3
Sunny (shaded)	5	3	2	0
Little or no sun	8	2	3	3
Not in window	4	0	4	0

From this table it is apparent that full sun is not necessary for growing successful Boston ferns. In fact, a high per cent of those ferns kept in sunny windows were not satisfactory, primarily because of injury due to drying caused by excess sunlight. All plants that were grown on tables away from windows were satisfactory, but none of them was excellent as they did not receive quite enough light. Generally speaking, the Boston fern can be very successful in a north window, or in a window that would give very little sun.

Watering

These ferns thrive with adequate water, but are somewhat tolerant to neglect and occasional drying. One plant that was left in an office for 17 months and grown on a table away from a window was in good condition at the end of this period. Several times, during this long stay in the office, this plant was subjected to rather severe drying. A lack of water caused damage to four of the six unsatisfactory plants. With three of these the lack of water was coupled with too much sunlight. The 22 plants were watered in all possible manners, but the general method used was soaking the plants thoroughly once they were dry and waiting to water again until the soil began to show signs of drying.

Fig. 12—One of the more desirable varieties of Boston fern

Containers

Plants included in this study were grown in porous pots with many of them set in jardinieres. A few larger plants growing in wooden tubs performed very well. Jardinieres were useful for decoration and helped to cut down the water requirement of the plants. When Boston ferns are kept in jardinieres they should not be allowed to stand in water for more than a few hours at a time, as rotting of the roots may result.

Temperature

There was little difference between the degree of success of various plants at different temperatures. The majority of plants were grown at temperatures from 60° - 70° F at night, with some grown at slightly higher temperatures. The Boston fern is more tolerant to warmer temperatures than many of the flowering plants, for it will stand 70° F or slightly higher at night without difficulty.

Feeding

Six of the 22 growers practiced regular feeding of their plants, and all had appreciable results. Feeding should be practiced on the Boston fern, especially if the plant is allowed to become pot-bound and to remain in a small pot for several months or more.

Insect control measures

None of the plants in this experiment were troubled with insects, possibly due to the fact that all plants were clean when placed in the homes. Mealybug and scale are the most troublesome insects on Boston fern. For control measures see pages 9-12.

Suggested summer care

The Boston fern should be grown indoors the year around for best results. Some growers place them on a porch, or in sheltered positions out-of-doors, in summer, but if this treatment is given they should be checked and watered regularly. At some time, during the summer period, this fern should be repotted to new soil, and, if additional plants are wanted, the old plant may be divided at this time. Little or no sun should be given ferns in the summer since they will thrive in indirect light.

Browallia Speciosa Major

This *Browallia*, sometimes called the bush violet, is quite often grown as a garden flower or in window boxes. The flowers are blue, shaped like a petunia but smaller. It is possible to have this plant in bloom the year around. Major conclusions drawn from experiments in trying browallia as a house plant are that it does not need full sun except in mid-winter, that it needs regular checking and watering, and that it is quite subject to insect attacks, especially attacks from thrips and aphids.

Of 26 plants used in this study, six or 23 per cent of them failed. The remaining 77 per cent were either satisfactory or excellent. The failures were caused primarily by insects, coupled, in some instances, with neglect, poor light, and night temperatures of 70° F or above.

Window exposure

All satisfactory plants received some sun, although full sun was not necessary. Several of the plants growing in northeast and northwest windows and receiving very little sun were among the best in the group. Plants receiving no direct sun or too little light quickly became spindly and stopped flowering. The full sun of a south window in late spring was detrimental in several cases. Many of the successful plants grown

in south or west windows were shaded by lace curtains, except during mid-winter. This plant cannot stand full sun in late spring or early summer unless very careful attention is given to watering.

Fig. 13—Browallia makes a desirable vine-like house plant

Watering

Almost all growers reported watering daily, or every other day, signifying that the browallia has a rather high water requirement. Plants growing in glazed containers required slightly fewer waterings.

Temperature

This browallia was able to stand night temperatures up to 70° F, provided it received plenty of sunshine. In two instances where the temperature was 70° F or above at night, and with poor light available to the plants in daytime, they failed completely. Temperature plays an important part in the control of thrips, also. Thrips damage was much more severe on plants grown at night temperatures at 65° - 70°F or above.

Feeding

Eight growers fed their plants regularly at two-week to three-week intervals after the plants were well started. Plants that were fed responded favorably, even though they were growing in a fertile soil mixture from the start. This plant is quite similar to other flowering plants in that regular feeding produces better growth and more flowers.

Insect control measures

Fully 60 per cent of the plants on trial were troubled with insects at some time or another during the period in which they were in the homes. Seven growers practiced some sort of insect control measure, either regular washing or spraying with insecticides. Regular washing or syringing is sufficient to rid plants of either thrips or aphids if the job is done carefully. It was rather interesting to note that plants grown at cooler

night temperatures showed very little damage from thrips, even though there were some thrips present on the plants at the end of the experiment.

Suggested summer care

Browallias are more satisfactory when grown as house plants only one season. It is an annual plant that is easily started from seed. For good spring and late winter flowering plants, the seed should be started in August and grown along in a cool sunny window in flats or pans until large enough to transplant. When plants are about two inches high they may be potted to the container in which they will flower. From then until flowering size, beginning when the plants are quite small, they may be given a maximum sun in either a south or east window. Along in the spring it may be necessary to shade the plants slightly or move them to a location that does not get full sun. Plants may be flowered on through the summer in pots, placed in window boxes, or set out in the garden.

Chrysanthemum Pot Plants

The chrysanthemum is one of the flowering perennials that can be used as a fall flowering plant indoors. About four months or more are required to grow good potted specimens, but the culture is not at all difficult under most home conditions. As different varieties of chrysanthemum vary in their time of blooming, it is possible, beginning with early hardy varieties, to have flowering pot plants from late July to early December. The later blooming sorts are those ordinarily grown

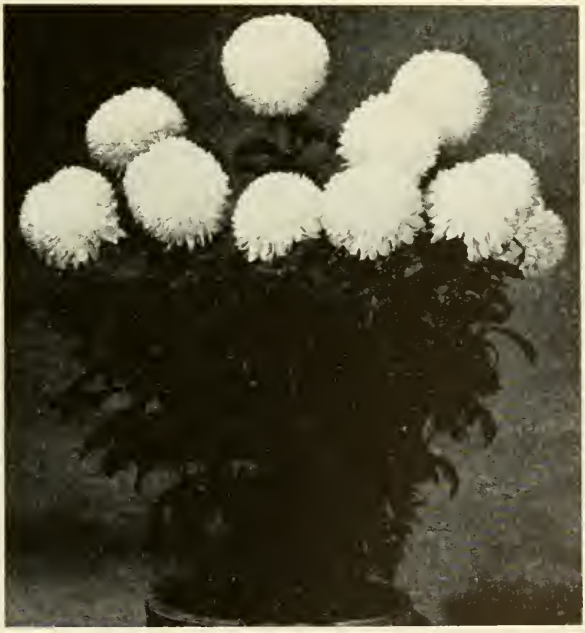

Fig. 14a—Granite State, one of the more desirable potted plant varieties for late October bloom. Each stem has been disbudded to one flower

under glass to flower in late fall and are not usually hardy, although a few varieties may be carried through the winter with the protection of a coldframe.

Not all chrysanthemum varieties are suitable for pot plants. Varieties best adapted to this method of culture are dwarf, free-branching ones, with good foliage and double or near-double flowers. The outdoor or field method of growing chrysanthemum pot plants, used for the past several years at the University of New Hampshire in developing new varieties, is perhaps the easiest and most suitable for the home gardener. An outline of this method of culture follows.

Propagation

Since chrysanthemums produce few, if any, seed and those produced do not come true to type, they must be propagated by division of the old clump or by rooting slips or cuttings from new growths in the spring. To maintain stock for propagation purposes old plants should be cut back after flowering and put away in a cold place. A cold basement window with good light and a temperature of from 40° - 50° F is suitable and only occasional watering is necessary when plants are in such a place. These old plants will send up a number of new shoots which can be roughly divided and planted out in the garden in May. If smaller plants are wanted, slips may be rooted as late as July 1 for pot plants to fit five-inch pots. The tips of vigorous shoots taken from plants growing in the garden are suitable for late propagation. These slips require from two to four weeks to root and may be planted back in the garden as soon as well rooted. Slips are easily rooted in boxes of clean sharp sand or in water. Some growers also report rooting them in boxes of soil. While the cuttings are rooting they should be kept in a cool, well-shaded place. When the rooted cuttings are transplanted to the garden it is desirable to water them well and shade them for several days. If old plants are not available for propagation, it is necessary to obtain

Fig. 14b—Field-grown plants require a pot about the size of the outer diameter of plant

young plants from florists or nurserymen. Only varieties suitable for pot plants should be purchased.

Pinching

To develop a well-branched plant, it is necessary to pinch off the tip growths regularly while the plant is growing in the garden. As soon as the plant becomes established and resumes growth, it should be pinched back to two or three inches from the soil level. This early pinching is one of the most important operations in developing the framework for a well-shaped pot plant. Soon after the first pinching three to four branches should start. After these branches have grown five or six leaves, they should be pinched back to about three leaves each. Subsequent pinching is necessary on branches that tend to grow too rapidly or as branches grow out five or six leaves from their origin. It is well to go over plants once a week until the time for potting and pinch any that are long enough.

Miscellaneous summer care

Chrysanthemum plants should be set in the best garden soil available. As they are heavy feeders they benefit from side dressing with plant food. A level tablespoon of 5-8-7, or similar fertilizer, worked into the soil around plants is a suitable application following the first pinching. A half handful of fertilizer worked into the soil in a band six inches to one foot from the stem of the plant following the second pinching will be sufficient. Additional water should be supplied in the event of dry weather.

Potting

It is best to pot the early blooming hardy chrysanthemums before the buds show color. For best results later blooming varieties should be potted not later than August 15-20. A mixture of about two parts good compost soil and one part well-rotted manure will make a good potting soil. A heaping tablespoon of 5-8-7, or similar fertilizer, mixed thoroughly with each gallon of soil mixture will be beneficial. Plants should be lifted from the garden with as large a ball of soil as possible and the excess soil carefully worked off. By mid-August a plant of seven inches in diameter will require a pot or tub about the same size *(Fig. 14B)* since most of the growth after potting is upward. If properly grown to this time, plants should be wider than tall.

After potting and soaking thoroughly with water, plants should be set in a cool, shaded place for a week. Additional water may not be required during this time. After a week new root growth will begin and plants may be *gradually* given full sun. Slight wilting during this time is not dangerous, but severe wilting may result in loss of the lower leaves. Too much water will give about the same results as a lack of it, causing the plant to take on a light color and eventually wilt. As soon as plants go into pots it is well to water by soaking the soil thoroughly, then wait until soil is slightly dry to the touch before watering again.

Plants may be placed in any convenient place out-of-doors in full sun until danger of severe frosts. The important thing is that they should not be neglected. Barring severely cold weather most varieties may be grown in a coldframe until the buds begin to show color, at which time they are ready for the house. Some growers who have tried this

method of culture have preferred to take plants directly into the house as soon as they are potted. This may be done but stockier plants will result if they are grown out-of-doors or in a coldframe. A feeding just as buds are sizing will usually add to the life of the plant.

Cooperating with us in trying this method of culture of chrysanthemums under home conditions, 11 members of the Tilton-Northfield Garden Club reported the following success:

Most plants were grown in cool, sunny windows until they were ready to flower. While in bloom, plants were subjected to night temperatures from 45° - 70° F and day temperatures from 60° - 70°F. All reported plants required water daily or every other day. Plants were decorative from about 30 to 50 days with those lasting the longest at cooler temperatures. In general, club members were quite successful in growing these plants.

Troubles

The tarnished plant bug sometimes causes severe injury on chrysanthemums in the field causing poor branching and blind-growth. If plants are left in the garden until flower buds are initiated, which occurs on later varieties in late August or early September, there is danger of the deformed flowers and blind-growth shown in *Fig. 14C*. A good coverage of fine sulphur dust applied after each rain will give good results as a repellent to this insect. If the plants are potted and taken from the garden before August 20, there is usually little or no danger from injury to the flowers.

Woodchucks sometimes find chrysanthemum plants particularly palatable, especially when they are making tender new growth. A sulphur dust coverage is helpful in repelling them.

Aphids are probably the most common insects to attack chrysanthemums indoors. If possible, it is well to spray plants thoroughly with blackleaf 40 or some other contact insecticide before bringing them in. It is sometimes necessary to spray stock plants during winter and spring.

Fig. 14c—The tarnished plant bug causes deformed flowers and plant growth

Some varieties suitable for pot plants

Hardy Chrysanthemums:

Azaleamums (most varieties) are suitable with blooming dates ranging from mid-July to September.

Cushion mums — same as for Azaleamums.

Early Bronze — late October bloom.

Exeter — yellow for early September.

Harmony — blooms July and later.

Cocheco — fine dwarf, rose-colored, blooming late September and October, very hardy.

Nashua — fine bronze for September.

Many others worthy of trial.

Greenhouse varieties:

Rodell Improved	Light yellow	Blooms October 20
*Smith's Superlative	Light yellow	Blooms October 25
*Ohio State	Light yellow	Blooms November 1
Nuggets	Light yellow	Blooms November 5
*Granite State	White	Blooms November 5

*Should be disbudded to one flower per stem as soon as flower buds can be removed.

Cordyline Terminalis

Cordyline terminalis, often called a dracena, is a colored-leaved foliage plant that is usually grown for decoration in locations not suitable for flowering plants. There are other species of *Cordyline* commonly grown, most of them being green or green and white in color. The principal fault with this genus of plants is that, if given adequate food, it will

Fig. 15—Cordyline, often called a dracaena, is an excellent plant for growing in poor light

grow too large for most homes. Dwarfing of cordylines may be accomplished by withholding food and by keeping the plants in pots as small as possible.

The results of growing 24 plants of *Cordyline terminalis* in as many homes for from two and one-half to 18 months were as follows: 14 good, four satisfactory, four unsatisfactory, and two failures. The failures were caused by too much water, rotting of the roots being the result. Three of the unsatisfactory plants were injured by too much sun or heat and drying, while the fourth was damaged after the grower oiled its leaves.

Soil used

A fibrous mixture of two parts compost and one part peat moss was used.

Window exposure

Plants were given almost every possible exposure around the home. Results obtained indicate that exposure is important only in its effect upon the water needs of this plant. *Cordyline terminalis* was found tolerant to poor light conditions if it was not overwatered. It could stand the sunniest windows in mid-winter and early spring but needed considerably more water than when not in sun. Some of the best plants were kept in good indirect light or near a sunny window, but shaded slightly.

Watering

The poor performance of all unsatisfactory plants was directly traceable to too much or too little water. The leaves of six plants were shined with a vegetable oil and three of these were damaged severely by overwatering shortly after. Apparently the oiling of the leaves cuts down the water loss from these plants, so the water supplied the plants should be reduced accordingly.

Cordyline plants kept at a high temperature or in sunny windows may need so much water that more than one daily watering is necessary. In such cases, it would be better to shade plants slightly or do something to lessen this high water requirement. On the other hand, these same plants not in sun and in fairly cool locations may require water only once or twice weekly.

The first symptoms of injury from drying usually will be dried spots on the leaves, together with slight scorching of the tips and margins. Damage from overwatering first causes rotting of the roots and eventually the loss of lower leaves. By occasional examination of the root system this trouble may be detected in time to prevent damage to the top of the plant. However, cordylines are not difficult to grow. The same watering practices that are used for most other plants will suffice.

Temperature

Plants were subjected to night temperatures from 45° - 75° F and day temperatures almost as variable. Cordylines will grow satisfactorily at 75° F if sufficient water and light are available. With higher temperatures more light and water will be necessary to grow successful plants.

Containers

Roughly, half the plants studied were in porous clay and half in glazed pots, while some of the porous were placed in jardinieres. There

was no difference in performance in the various kinds of pots although plants growing in porous pots required slightly more water.

Feeding

Only five growers fed their plants, these five plants all being in the successful group. Little or no food should be necessary so long as a cordyline plant is given good soil at the time of repotting. This plant is one of a group that tends to grow large after several years, so feeding will cause it to grow past the medium-sized stage rather rapidly.

Insect control measures

As the broad leaves of the cordyline catch dust easily, about two-thirds of the growers practiced regular washing of these plants. Washing serves to remove this dust and since the leaves are smooth, insects are readily washed off, especially if water is used under pressure. Mealybug is usually the most troublesome insect on this plant but should not be difficult to wash off.

Suggested summer care

Cordylines will be more satisfactory if kept indoors the year around. In summer they should be shaded from direct sun. Plants that are placed out-of-doors in shaded locations should be watered just as regularly as indoors. If the foliage is severely damaged by excess drying, the plant will require many months to recover its decorative value. Repotting or shifting to larger pots may be necessary each summer. In repotting, the entire soil mass may be changed by washing the old soil from the roots and replacing with a fresh mixture. By keeping them slightly cramped in five- or six-inch pots cordylines may be kept for five or more years before they finally grow too large.

Cyclamen

Cyclamen africanum

The cyclamen is a lovely, though often unsatisfactory, holiday plant which to some few house-plant growers proves a fine winter blooming plant. To learn more about its culture in the home, 20 cyclamen plants were placed in as many homes in early December when they were just beginning to throw up flower stems. Absolutely no instructions were given for handling these plants. The high per cent of failures (50) shows the difficulty with which these plants are grown. However, the information obtained should help to reduce the number of failures with the cyclamen.

The 20 plants under test performed as follows: five very satisfactory, five satisfactory, and ten failures. The failures were caused almost entirely by drying with at least four plants failing because of a combination of high temperature and drying. One plant kept in a jardiniere developed root rot, undoubtedly receiving too much water. The most satisfactory plants lasted in good bloom for two-and-a-half months and longer, while most of the failures came during the first two weeks that the plants were in the home.

Window exposure

A wide variety of exposures was given these plants. Of the ten plants which were satisfactory four were kept in sunny windows with

no shade and six were given little or no sun. Plants seemed to be equally successful in east and northeast exposures and in sunny windows with a lace curtain to protect them from the direct sun. Of the ten failures seven were kept in sunny windows with no protection from the direct sun. Of 11 plants in the entire group that were kept in sunny windows with no protection seven failed.

Fig. 16—The cyclamen is one of the florist pot plants with which few people have success

Watering

The relation between watering and window exposure accounted for most of the failures. In sunny windows the cyclamen dries out more quickly, hence chances for failures are greater. Severe wilting of the cyclamen will usually cause the small flower buds to blast, and explains the failure of many plants. Without a doubt, even moisture content and regular watering are most important with this plant. All ten of the successful growers checked their plants daily and those with plants in sunny windows reported watering daily. Root rot may develop if plants are overwatered, especially if they are allowed to stand in water. A thorough soaking should be given each time the plant is watered.

Temperature

Cool temperatures, especially at night, are necessary for best results with the cyclamen plant. The plants in this experiment were subjected to night temperatures ranging from 45° - 72° F. None of the plants grown in temperatures above 65° F at night was satisfactory. *Fig. 2* illustrates the effect of temperature on cyclamen.

Feeding

Only three growers fed their plants; but feeding cyclamen is a good practice since color of the foliage and life of the plant can be increased greatly.

Insect control measures

The red spider mite was the only insect causing trouble to these plants, this trouble being slight. If plants are clean of insects when received, there will be little or no trouble from them. The two insects likely to be present on cyclamen when they are purchased are actually mites, not insects. The red spider mite is plainly visible to the naked eye, though extremely small, and may be controlled by the regular syringing or washing of the plant. Cyclamen mite is so small that it is visible only with the aid of a lens. However, the damage which it causes is plainly visible. First signs of cyclamen mite injury are deformed flowers and cupped or curled leaves. Extreme infestation from this mite will render a plant useless. Unfortunately, there are no satisfactory means of control of this mite under home conditions and a plant severely infested should be destroyed. Extreme care should be used to avoid spreading this mite to other house plants, especially African violets. They are spread primarily by handling or by direct contact.

Suggested summer care

Some few people are successful in carrying cyclamen over from year to year. When this is done the plant should be allowed to ripen and dry off gradually following its blooming period. After the plant has thoroughly dried and the leaves have dropped, the bulb may be shaken out of the soil and repotted to a good house-plant soil mixture. Watering once a week or less often will suffice until growth is resumed. It is well to grow the cyclamen through the summer in a partially shaded location, either in a window or on a porch; then in fall it should have a cool, sunny window. Adequate and even moisture is essential at all times. Many growers prefer to purchase new and well-grown plants each fall since the chances are against success in carrying the bulbs over.

Dracaena Godseffiana

Dracaena godseffiana is a slow-growing foliage plant that has been found to stand much neglect and abuse and still remain decorative. Since its light requirement is low, it is highly useful in many locations in the home.

Eighteen plants of this dracaena were under observation for three and one-half to 12 months. Of this group only three plants were not satisfactory and none were failures. Two unsatisfactory plants were damaged by drying and neglect, and the third was unexplainable — probably injured by kindness.

Soil used

A mixture of one part leaf mold and two parts good compost was used.

Window exposure

This plant succeeded in all possible exposures. Plants grown on tables in rooms with poor light conditions seem to thrive equally as well, if not better, than plants grown in sunny windows. Slight drying of plants in sunny windows in late spring caused the leaves to take on a yellowish cast. Two plants promptly dropped their leaves when set out-of-doors in pots in early June.

Watering

Although two plants suffered from drying, many more were watered irregularly without ill effects. *Dracaena godseffiana* uses very little water compared to many house plants and seems to be tolerant to drying. Most growers reported soaking these plants twice weekly or less. If plants were not in sunny windows or near radiators, they could stand one or two weeks without water.

Fig. 17—This dracaena godseffiana is one of the most fool-proof house plants known

Temperatures

Plants withstood night temperatures ranging from 55° - 75° F without ill effects. Of four plants tried in offices with poor light and high night temperatures, all were highly satisfactory.

Containers

Since this plant is more valuable for its decorative foliage than in the window garden, it may be given a decorative container to harmonize with its surroundings. Plants on trial succeeded well in either porous or glazed containers.

Feeding

A good soil mixture supplied at repotting about every two years should supply all the food necessary for this plant. A desirable slow growth may be obtained by withholding plant food and by repotting at wide intervals. Eight of the 18 growers fed their plants, but with no appreciable results.

Insect control and summer care are the same as for *Cordyline terminalis*. Under no circumstances should this plant be set outside in full sun. It will be far better if kept indoors the year around.

Gardenia

Gardenia jasminoides Veitch

The small-flowered gardenia has been the most interesting of the many plants which we have placed in homes. As one grower puts it, "The flowers are worth waiting for." Twenty-nine growers grew this

gardenia for periods of from two and one-half to 12 months. Twelve housewives were highly successful with their plants; five grew satisfactory plants; four were fair; and eight were not satisfactory. Insufficient water resulting in a blasting of the flower buds *(Fig. 18B)* caused seven of the eight plants to be unsatisfactory. A lack of light con-

Fig. 18a—This 4-year old plant spent 3 years in a New Hampshire home

tributed to the poor performance of three of these and too much water caused chlorosis on the other one. Five of the poorest plants, also, were grown at high night temperatures of from 70° - 75° F.

The soil used for these plants was a fibrous mixture of one part well-rotted manure and two parts good compost soil.

Fig. 18b (left)—Flower buds may discolor and drop at any stage. Fig. 18c (right)Chlorosis on gardenia may come from a number of causes

Window exposure

All plants that were satisfactory were grown in sunny windows with south and southwest exposures predominating. A few growers reported shading their plants slightly during heavy periods of blooming. The only three plants not grown in sunny windows were unsatisfactory.

Watering

Insufficient water contributed to the failure of seven plants, while too much water damaged four. A lack of water was the principal cause of premature dropping of the flower buds. The most successful growers were those who soaked the entire ball thoroughly at each watering. To avoid damage from overwatering it is well to wait until the top of the soil is slightly dry to the touch before watering again. If, at any time, the soil becomes excessively dry, it is well to set the pot in a larger container of water and let the ball of soil and roots soak thoroughly.

Chlorosis

Varying degrees of chlorosis or yellowing of the leaves *(Fig. 18C)* occurred on eight of the 29 plants. The four most serious cases were traceable to overwatering. Two cases could possibly have been caused by low night temperatures. Two slight cases were not traceable.

Temperature

All of the successful plants in this study were grown at a night temperature between 60° - 70° F. Five of the unsatisfactory plants were grown at night temperatures of 70° - 75° F. The gardenia thrives on slightly more heat than the general run of flowering house plants. Temperatures below 60° F cause extremely slow growth and some danger from chlorosis.

Container

Glazed or painted containers are more satisfactory since slightly less water is required. The possibility for bud drop on gardenia is greater when plants are growing in porous pots, for drying out is more rapid.

Feeding

Eleven of the 17 successful growers fed their plants regularly, while only one of the unsatisfactory plants was fed. The gardenia is a heavy feeder, especially when it is maturing a large crop of flower buds.

Insect control measures

Insects are not usually serious pests on the gardenia. Nineteen of the group of 29 growers washed their plants as a precaution against insects and to keep the plants clean of dust. Three of the unsatisfactory plants grown at high temperatures and not washed were troubled with red spider mite. One plant was troubled with aphids. The gardenia may also be attacked by mealybugs. Since this plant is very easily washed or syringed with water under pressure, insects need not cause trouble. Regular weekly washing is not only good for the plant but keeps insects under control.

Suggested summer care

The gardenia may be grown indoors through the summer or it may be placed out-of-doors in a partially shaded place. If grown indoors, it

should have some protection from the sun during the hottest part of the day. If placed out-of-doors, the entire pot should be plunged into the soil rather than setting the plant directly in the ground. A shift to a larger container in early fall will start abundant new growth which is necessary to supply winter blossoms. Some growers prefer to start new slips or cuttings each year so the old plants can be thrown out after two-years' growth.

Gloxinia

Sinningia speciosa

Although the gloxinia is closely related to the African violet, it is less tolerant to high temperature and more difficult to grow in the home. Many of the most successful growers of this lovely plant live in farm homes with no centralized heating plant so they are able to grow their plants cooler. The gloxinia will not stand neglect even for a few days without serious damage resulting to its crop of flowers.

The gloxinia was studied in two different groups. Of 19 plants distributed in one group and left in homes for periods up to 12 months the results were as follows:

Table III

	Number	Per cent of total
Very satisfactory	6	31½
Satisfactory	4	21
Fair	3	16
Failures	6	31½

Of 12 plants distributed in another group nine failed. Since this latter group was distributed in small pots and many of them failed within a short time, regardless of care, the results are not included in the table.

Fig. 19a (left)—A well-grown gloxinia seedling. Fig. 19b (right)—Thrips injury or insufficient watering may cause flower buds to blast

The condition of the plants when distributed, or the size pot in which they were growing, contributed more to their failure than the care which was given them.

All plants, except one, had some direct sunlight – the one failed. The most successful growers gave their plants all the sun possible during mid-winter and then, as the sun became brighter, they gave their plants partial shade by a lace curtain, placing them away from the window, etc. Three plants were started in north windows but after they failed to do well they were moved to sunny windows.

Water

All growers reported that gloxinia plants needed a lot of water, especially when growing actively. Many of the successful growers soaked their plants thoroughly at each watering. Some kept their plant sitting in a deep saucer and filled the saucer with water as the plant needed it. Lack of water or neglect in watering was the cause for flower buds blasting in several instances. There were no known cases of overwatering although this is possible, especially if the plant is allowed to stand in water continuously.

Although various containers were used, porous pots seem to be the most desirable. They may be set in deep saucers or bowls when proper watering is easily done. Glazed pots cut down water loss and cause plants to require water less frequently, but it is more difficult to tell when the plants need water.

Temperature

Night temperatures varied from 50° to above 70° F. There is little chance of success with gloxinias if room temperature is 70° or above day and night. From 55° - 65° F is about the optimum range.

Feeding

Only five growers fed their plants. Plants that were fed regularly responded with more flowers and a heavier tuber at the end of the growth period. Feeding will not take the place of a good soil, especially one with a good physical condition.

Insects

Thrips were the most troublesome insects on these gloxinia plants although not the only ones that attacked them. Aphids, mealybugs, and mites may be troublesome. Damage from thrips was much more serious at warmer temperature. Most of the failures were caused in part by thrips injury.

Thrips injury on gloxinia *(Fig. 6A)* has a rusty appearance under the leaves and a flecking of lighter areas on the upper surfaces. Leaves may curl slightly or become deformed and in severe cases the flower buds blast and fail to open. As the leaves are so brittle they cannot be washed, insecticides used as sprays or dips must be used. (See section on insect control for suitable sprays.)

Suggested care when tubers are dormant

Many growers lost the tubers after their plants stopped flowering. In most cases, the tubers that died were placed in the basement and neglected. Usually, about two or more months of rest will be needed before the gloxinia is ready to grow again.

A cooler location and occasional watering is all that is necessary to carry the tubers through the rest period. They may be left in the same pot and soil until new growth begins, then repotted with a good soil mixture and placed back in the window. If thrips have been troublesome, it is well to use naphthalene flakes liberally while the tubers are dormant. A thin covering of these flakes used several times will greatly decrease, if not eliminate, thrips.

It is possible to have gloxinias flower twice yearly and some instances have been known when they flowered almost a year without resting. The spring and summer crop of flowers is usually the most satisfactory.

Manettia Bicolor

Manettia bicolor, or the firecracker vine, is a too little known member of the madder family. This plant has been grown as a house plant for many years but few people have seen it or know of its possibilities. It is a vine, so for best results it should be wound around some sort of small trellis to keep it in bounds. The common name comes from the flowers, which are tube-like, red tipped with yellow, and produced abundantly under proper conditions.

Twenty-seven plants left in homes for periods of from two to eight months performed as follows: nine excellent, nine good, and nine not satisfactory.

Rating was based on condition of plant and production of flowers. Most of the group rated not satisfactory were not free in flowering and all were injured by insects in varying degrees.

Window exposure

All plants, except one, in the good and excellent groups were kept in sunny windows with the majority of these either in south or southwest exposures. One plant was grown successfully, though much more slowly, in a northeast window with cool night temperatures. Of those plants considered not satisfactory, seven were grown in sunny windows, one in a northeast window, and one had no direct sun. The amount of sun received by these plants had a decided effect upon the number of flowers produced.

Watering

The majority of the growers reported watering these plants daily, especially after their plants had made considerable growth. Some who watered every other day grew their plants somewhat cooler or had them in glazed pots. A lack of water, especially when the manettia vine is growing in bright sunlight, will cause a reddening of the older leaves.

Temperatures

Night temperatures ranging from 50° - 70° F were not directly responsible for any of the failures, but high temperatures contributed to the failure of some in causing a much more rapid multiplication of thrips. A majority of the plants rating good and excellent were grown at 60° - 65° F night temperatures though cooler temperatures were not detrimental.

Container

Roughly, half of the plants were grown in porous pots and half in glazed containers of equal size. The type of container did not affect the degree of success of these plants.

Feeding

Eight of the 18 successful plants were fed either regularly or occasionally, while none of the unsuccessful plants were fed. With Manettia bicolor, as with most other flowering plants, there is a decided response to regular feeding, especially if the plant is grown for periods of six months or longer or if the plant is not started in a fertile soil.

Fig. 20—Manettia is a little known but highly satisfactory house plant

Insect control measures

Six growers washed or syringed their plants regularly while three sprayed their plants with insecticides. Of these nine plants that were washed or sprayed only two had any insects when returned. Twelve of the remaining 18 plants were infested with thrips and one was infested with aphis. Some of the plants were infested very slightly, however, so as not to detract from their appearance. Undoubtedly there were thrips present on most of the plants when distributed. Thrips may be controlled on manettia by regular weekly washings with a jet of lukewarm water. The plant should be inverted under a faucet and syringed briskly

and thoroughly. As it is not possible to get all the insects at one time, the operation should be repeated weekly for some time. A reinfestation may easily occur if other plants in the home have thrips, for the manettia vine is much to their taste. The same control measures are suitable for aphis and mealybug on this plant. It should also be noted that thrips are much more troublesome at higher temperatures around 70° F or above.

Suggested summer care

Some growers rest their manettia plants out-of-doors in a sheltered spot during summer. Still others grow them indoors the year around. More vigorous and satisfactory plants may be had by starting new plants from slips early each summer. If grown indoors in good soil, these summer-rooted slips will bloom all the following winter and spring.

Baby Primrose

*Primula malacoides**

The baby primrose or *Primula malacoides* is one of the pot plants ordinarily grown by florists and sold when in full bloom. Often these plants are not too satisfactory because the sudden change from greenhouse to home conditions is too much for them at this stage. To be most successful as flowering house plants they should be purchased when in bud or earlier. Plants in the proper stage are usually available from florists during late fall and early winter and often at lower prices than when in full bloom.

Of 20 plants grown by as many growers their condition or degree of success was as follows: 12 good to excellent, two fair, and six poor or failure. Of the six plants rated poor or failure three were vegetative but

Fig. 21a (left)—The baby primrose can give 5 months of bloom if properly cared for. Fig. 21b (right)—Unless primroses have a cool night temperature they may fail to flower. (See plant on left.) The plant on right has flowered and is in need of plant food

*This species does not cause a skin rash such as that caused by some other species of primula.

with no flowers; one died of crown rot due to overwatering; one was not kept in a window; and one was kept at 70° - 75° F night temperature. None of this group had temperatures below 65° F at night.

The soil used for *Primula malacoides* was a mixture of three parts good compost, one part leaf mold, one-half part sharp sand.

Window exposure

All plants that rated good to excellent were kept in sunny windows without appreciable shade of any sort. Most of the successful plants were in south windows to get a maximum of sun.

Of two plants rating fair one was partially shaded and the other was kept in an east window that received little sun. Neither of these flowered freely although their foliage was excellent.

Of the six failures three received very little or no sunlight and three failed because of other reasons.

Watering

The baby primrose requires daily attention. Of the 20 growers, 16 reported watering their plants daily. Several growers remarked that this plants wilts quickly if neglected. Most of the plants were watered by applying water to the top of the soil but it is advisable to take precautions against wetting the crown of the plant to excess. Crown rot, which is caused by too much water, may sometimes kill a plant almost overnight. One plant failed of crown rot, primarily because the plant was left standing in water in a jardiniere. A good method of watering this primrose is to set it in water until the ball of soil is thoroughly soaked. To avoid overwatering, water should not be applied again until the soil has a dry appearance or is slightly dry to the touch.

Containers

All plants were grown in porous pots. Some pots were set in jardinieres. But when this is practiced care should be taken that the plant does not stand in water for any length of time.

Tempratures

The baby primrose has little if any chance of succeeding when night temperatures run 65° F or above. All plants in this experiment that succeeded had temperatures of less than 65° F, while those failing were kept at 65° F or above. The most desirable was 50° - 60° F. At temperatures above 65° F there is a tendency for plants to be vegetative with no bloom produced, as illustrated in *Fig. 21B.*

Feeding

Eight of the 12 best plants were fed regularly. In general, the response to feeding was a much longer period of bloom. The baby primrose, when growing properly, should flower freely once it has reached the flowering stage. This heavy production of flowers is a drain on the plant which can partially be offset by regular feeding.

Insect control measures

No insects were reported on any of the plants used in this experiment. Aphis, or green fly, sometimes attacks the baby primrose but is easily controlled by ordinary methods.

Crown rot

The most prevalent trouble may be avoided by proper watering practices.

Suggested summer care

Although house-plant growers occasionaly try to carry these plants over a second year, this is rarely a successful practice. The baby primrose should be treated as an annual plant and discarded when the flowering period is finished. Due to the long period required to flower these plants from seed, it is advisable to purchase well established plants from florists instead of trying to grow them in the home. Plants in the proper stage are available in late fall or early winter. For those who enjoy growing plants from seed, these may be obtained from any reputable seedsman and should be started about mid-summer. Plenty of growing space and a cool, partially shaded location are desirable conditions for the young seedlings.

Pteris or Table Fern

The *Pteris* or table fern is one of those plants quite often available in stores but seldom successful in our home. The two most popular species are a green one, *Pteris cretica*, and a variegated species, *Pteris ensiformis victoriae*. Of the two the green species may be somewhat

Fig. 22—The small variegated table fern is one of the most difficult plants to grow

easier to grow but the variegated one is more decorative. Cultural information applying to *Pteris ensiformis victoriae* should also be helpful in growing *Pteris cretica.*

From the information obtained from 21 plants placed in as many homes, it seems that *Pteris ensiformis victoriae* is as difficult to grow as the maidenhair fern. The condition of the 21 plants at the end of two to three months was as follows: three very satisfactory, two satisfactory, and 16 not satisfactory. It is rather difficult to account for some of the failures from the data obtained. Neglect contributed to the poor condition of at least three plants, while lack of light affected at least eight.

The soil used was a mixture of one part leaf mold and two parts good compost.

Window exposure

Of the five successful plants four received some, though not full, sun and one was grown near a window in a very light room but with no direct sun.

Of the 16 unsuccessful plants, nine received no sun at all and three were grown part of the time in sunny windows. Perhaps "table fern" is misnomer for this plant, for good light seems to be its prime need. If other conditions are satisfactory, one to two hours of sun, or very good indirect light, should suffice. Without a doubt many of the failures were due to insufficient light.

Watering

With the exception of three plants that were neglected there was no apparent trouble from this source. As the plants were in small pots, most growers reported watering their plants either daily or every other day.

Temperatures

All satisfactory plants were grown at night temperatures from 60° - 65° F. Some of the unsuccessful plants were grown at temperatures up to 70° F but this alone was not the cause of their failure.

Containers

All pteris plants in this test were distributed in three-inch glazed or painted pots. Porous pots were not used because in this small size they dry out too rapidly under home conditions.

Feeding

Feeding was practiced by only three growers and with no appreciable results. However, occasional feeding should be beneficial to table ferns if they are grown as year-around plants.

Insect control measures

There were no insects present on any of the plants in this group. On the whole, these ferns are probably less subject to insect attacks than are most other plants. Since they are easily washed or syringed this is a good precautionary measure against bugs and is beneficial in keeping the plants free of dust.

Suggested summer care

Pteris ensiformis victoriae may be placed out-of-doors in a shaded and well protected place through the summer, or it may be grown indoors. If placed out of doors, provisions should be made that it does not dry excessively. As light conditions are more favorable in summer, a north window should be ideal for this plant. Plants grown more than one year will be benefitted by repotting at least once yearly, using a good house-plant soil mixture.

REMINDERS
(Insect Control Measures)

1. Tartar emetic is a deadly poison. It should be used with extreme care. *(See page 11.)*

2. DDT *(see page 12)* is a relatively new insecticide which has been found to be effective against most house-plant pests *except* red spider. It is obtainable in a wettable powder form for spraying and as a dust containing 3 to 5 per cent DDT. Both have proved safe to use on house plants. Do not use DDT preparations that contain petroleum by-products as the solvent. This type is used for flies and mosquitoes. The solvent will injure the plants.

3. Insecticides should always be used according to packagers' instructions. *(See page 13.)*

INDEX

African violet, *Saintpaulia kewensis,*
color of 19
containers for 17
feeding 17
insect control 17-18
leaf spot 18
number in experiment 15
propagation 19
summer care of 18
temperature for 17

Aphids on
chrysanthemums 30
gardenia 38
manettia 42-43

Begonia, wax-leaf, *Begonia semperflorens,*
Calla begonia, additional notes 22-23
containers for 20
feeding 20
flower color ranges 19
insect control 22
key to other troubles 22
pruning 23
results of drying 21
soil used for 20
temperature for 22
varieties used in experiment, Table I 19
watering 21
window exposure 20

Boston fern, *Nephrolepis exaltata,*
containers for 24
feeding 25
insect control 25
number in experiment 22
summer care 25
temperature for 25
watering 24
window exposures, Table II 23

Browallia, *Browallia Speciosa Major*
description of 25
feeding 26
insect control 26
number in experiment 25
summer care 27
temperature 26
watering 26
window exposure 25

Bush violet, *see Browallia*

Chemical garden fertilizers 4

Chrysanthemum pot plants,
insect control 30
pinching tip growths 29
potting 29
propagation 28
summer care 29
temperature 30
time of blooming 27
troubles with 30
varieties suitable for pot plants 28
window exposures 30

Containers for,
African violet 17
begonia 20
Boston fern 24
cordyline 32-33
dracaena 36
gardenia 38
manettia 42
primrose, baby 44
pteris 46

Containers, kinds,
glazed pots 4
jardinieres 4

Cordyline, *Cordyline terminalis,*
containers for 32-33
description of 31
feeding 33
insect control 33
number used in experiment 32
soil used 32
summer care 33
temperature 32
watering 32
window exposure 32

Cyclamen, *Cyclamen africanum*
description of 33
feeding 34
insect control 35
number used in experiment 33
summer care 35
temperature 34
watering 34

Dracaena godseffiana,
containers 36
description of 35
feeding 36
number used in experiment 35
soil used 35
summer care 36
temperatures 36

Dracaena godseffiana, (cont.)
watering 36
window exposure 35

Experiments with house plants, general 3-15
containers 4
feeding 4-5
insect control 9-15
method, with questionnaire 3-4
propagation 6-8
soils used 4
temperature 6
water 5

Experiments, selected 15-47
African violet 15-19
Begonia semperflorens and varieties 19-23
Boston fern 23-25
browallia 25-26
chrysanthemum pot plants 27-31
cordyline terminalis 31-33
cyclamen 33-35
dracaena godseffianna 35-36
gardenia 36-39
gloxinia 39-41
manettia bicolor 41-43
primrose, baby 43-45
pteris 45-48

Feeding houseplants, general 4

Feeding, selected plants,
African violet 17
begonia 20
Boston fern 25
browallia 26
cordyline 32
cyclamen 34
dracaena 36
gardenia 38
gloxinia 40
manettia 41
primrose, baby 44
pteris 46

Firecracker Vine, *see manettia*

Garden Club, Tilton-Northfield cooperation 30

Gardenia, *gardenia jasminoides*,
containers 38
chlorosis on 38
feeding 38
insect control 38
number used in experiment 36-37
soil used 37
summer care 38-39
temperature 38
watering 38
window exposure 38

Gloxinia, *Sinningia speciosa*,
description of 39
feeding 40
insect control 40
results of experiment, Table III 39
summer care 40-41
tubers, care of white dormant 40
temperature 40
water 40

Insect control, general 9-15
aphids 12-13
greenfly, *see aphids*
mealybug 9-10
mites 13-15
scale insects 11-12
tarnished plant bug 30
thrips 11
white fly 13
container 42

Manettia bicolor,
description of 41
feeding 42
insect control 42-43
number used in experiment 41
temperatures 41-42
watering 41
window exposure 41

Mealybug, on,
African violet 17-18
begonia 22
Boston fern 25
cordyline 33
gardenia 38

Method of experiments 3

Mites, cyclamen, on,
African violets 17-18
cyclamen 35

Mites, red spider on
begonia 22
cyclamen 35

Primrose, baby, *primula malacoides*,
containers 44
crown rot on 45
feeding 44
insect control 44
number used in experiment 43
summer care 45
temperatures 44
time to buy 43
watering 44
window exposures 44

Propagation, genera rules 6-8

Pteris,
feeding 46
insect control 46

Pteris, (cont.)
number used in experiment 46
popular species 45-46
summer care 47
watering 46
window exposure 46

Questionnaire used in study 4

Scale insects on
Boston fern 25

Soil insects and lower animals 15

Soils used, general 4

Soils used, selected plants,
African violet 15
begonia 20
cordyline 32
dracaena 35
gardenia 37

Summer care of house plants, selected,
African violets 18
begonia 23
Boston fern 25
browallia 27
chrysanthemum pot plants 29
cordyline 33
cyclamen 35
dracaena 36
gardenia 36
gloxinia 40-41
manettia 43
primrose, baby 45
pteris 47

Table fern, *see pteris*

Tarnished plant bug 30

Thrips on
begonia 22
browallia 26

Temperatures, day and night 6

Temperatures, houseplants, selected
African violet 17
begonia 22
Boston fern 25
browallia 26
cordyline 32
cyclamen 34
dracaena 36
gardenia 38
gloxinia 40
manettia 41
primrose, baby 44
pteris 46

Water 5

Water for houseplants, selected
African violet 16
begonia 21
Boston fern 24
browallia 26
cordyline 32
cyclamen 33-34
dracaena 36
gardenia 38
gloxinia 40
manettia 41
primrose, baby 44
pteris 46

White fly, control 13

Window exposure, houseplants, selected
African violet 16
begonia 20
Boston fern 23-24
browallia 25-26
cordyline 32
cyclamen 33-34
dracaena 35
gardenia 38
gloxinia 40
manettia 41
primrose, baby 44
pteris 46